

Remarks

Claims 1 through 30 are pending in the application and have all been rejected for various reasons as specified by the Examiner in the Office Action.

In paragraph 2 of the Office Action, the Examiner has objected to the disclosure because of informalities in paragraph 34, paragraph 36, and claims 4, 7, 10, 13, 15, 25, 26, 28, and 29. In response, the Applicants have amended paragraphs 34 and 36, and have made the appropriate amendments in each of the claims to correct the informalities.

In paragraph 3 of the Office Action, the Examiner has objected to the drawings as failing to comply with 37 C.F.R. § 1.84(4) because reference number "68" in Figure 4 has been used to designate different components of that drawing. In response, a replacement drawing containing an amended Figure 4 has been provided in which reference number "68" referring to digital I/Os in the upper left hand corner has been replaced with reference number "65". In addition, paragraph 44 has been amended to replace reference number "68" in reference to digital I/O ports with reference number "65".

In Paragraph 4 of the Office Action, the Examiner has objected to Figure 6, stating that a section of the figure on the left hand side is missing. In response, the Applicants state that the file containing Figure 6 which was submitted with the electronic filing of this application contains the entire Figure 6 and has been reprinted and included herein for the Examiner's reference. Should the Examiner still have an issue with respect to Figure 6, the Applicants respectfully request that the Examiner contact the Applicants' attorney at the number listed at the end of this Response to discuss the matter.

The Examiner has rejected Claims 2-4, 8-11, 15, 19-21, and 27-29 under 35 U.S.C. § 112, second paragraph as being indefinite.

With respect to Claim 2, the Examiner states that the phrase "said field replaceable units" in line 2 lacks sufficient antecedent basis. In response, the Applicants have modified Claim 2 to replace the phrase "field replaceable units" with the phrase "field replaceable portions".

The Examiner has rejected Claim 8 stating that it contains the limitation "each of said electronic microcontrollers" which lacks sufficient antecedent basis. In response, the Applicants have amended Claim 1 of the application to specify that each field replaceable portion contains a corresponding electronic microcontroller. Claims 9 and 10 contain the same limitation.

The Examiner states that Claim 10 recites the limitation "said portion specific software" which lacks sufficient antecedent basis. In response, Claim 1 has been amended to specify that each of said one or more electronic microcontrollers contains "portion specific software".

The Examiner states that Claim 11 recites the limitation "said redundant microprocessors" which lacks sufficient antecedent basis. Claim 11 depends from Claim 10 which depends from Claim 9. Claim 9 includes the limitation "redundant, independent microprocessors". Claim 11 has been modified to include the limitation "redundant, independent microprocessors" and therefore, Claim 9 provides the antecedent basis for this phrase in Claim 11.

The Examiner states that Claim 15 recites the limitation "said network of distributed microcontrollers" which lacks sufficient antecedent basis. Claim 15 has been modified to depend upon Claim 14 and the phrase "network of distributed microcontrollers" has been replaced by the

phrase "one or more redundant networks" which has antecedent basis in Claim 13, from which Claim 15 ultimately depends.

The Examiner states that Claims 19 and 20 contain the limitation "said redundancy control circuit" which lacks sufficient antecedent basis. In response, Claim 12, from which Claims 19 and 20 depend, has been amended to include the phrase "redundancy control portion"

Claim 27 includes the limitation "said gateway" and "said locomotives network" both of which lack sufficient antecedent basis. In response, Claim 27 has been amended to depend from Claim 21. Claim 21 contains antecedent basis for "said gateway" and "locomotive network". In addition, Claim 27 has been amended to correct the misspelling of "locomotives network" with "locomotive network".

The Examiner states that Claim 29 recites the limitation "said redundancy control circuit" which lacks sufficient antecedent basis. In response, Claim 29 has been amended to replace the phrase "redundancy control circuitry" with the phrase "redundancy control portion" which finds antecedent basis in Claim 12 which from which Claim 29 ultimately depends.

The Applicants point out that all amendments described heretofore have been in response to the Examiner's objections of the claims and specification based on informalities and the Examiner's rejections of the claims based on 35 U.S.C. § 112, second paragraph for lack of antecedent basis. These amendments do not alter the scope of the claims and have not been made in response to any specific rejection of the claims involving prior art.

The Examiner states that Claims 1 through 30 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 6,135,574 (Pettit, et al.).

The Applicants are in disagreement with the Examiner's assessment that all limitations of all the currently pending claims are disclosed in the cited reference. In particular, the Applicants disagree that the limitations of original Claim 9 are disclosed in the reference. This includes the limitation that each of the electronic microcontrollers comprises redundant independent microprocessors and a redundancy control circuit for deciding which of the redundant independent microprocessors is active at any particular time. This limitation is not disclosed anywhere in the cited reference and is not discussed by the Examiner in his rejection of Claim 9. Therefore, the limitations of Claim 9 have been moved to independent Claims 1, 12, and 30, and those claims should be rendered allowable thereby.

In addition, Claim 1 has been amended to make it clear that the claimed electronic braking control include an electronic microcontroller corresponding to each of the field replaceable portions. While a similar feature is discussed in the cited reference wherein the individual portions of the EPCU are described as including a control node, which is roughly equivalent to the microcontrollers of the present invention, the control nodes of the cited reference do not include redundant independent microprocessors on each control node, or a redundancy control circuit.

In addition, Claim 8 of the present application has been amended to include the limitation that each of the electronic microcontrollers corresponding to each of the field replaceable portions is in communication with all other electronic microcontrollers for all other field replaceable portions, and in addition, with a computer on the locomotive over one or more redundant common networks. This differs from the cited reference in two ways. First, the cited reference does not include multiple, redundant common networks between each of the

microcontrollers on the field replaceable units. The multiple, redundant common networks correspond to the redundant microprocessors on each of the microcontrollers in each field replaceable unit such that each redundant microprocessor in each microcontroller is on an independent network from all other redundant microprocessors on each microcontroller.

In addition, the amended Claim 8 differs from the cited reference in that the microcontrollers in each of the field replaceable units is on a network which is common with the locomotive computer. This differs from the cited reference in the following way, which is shown in Figure 4 of the cited reference. In the cited reference, the architecture diagram shown in Figure 4 shows that each of the controllers within the EPCU connects to a box labeled "IPM" which in the cited reference stands for "integrated processor module". In column 6, lines 29 through 31, the cited reference states "The IPM provides high level brake control logic, locomotive system integration communication or interfacing." Thus, the control nodes in each field replaceable unit of the cited reference are connected to the IPM, which in turn is connected to the locomotive computer. Thus, the IPM of the cited reference provides a single point of failure, whereas this single point of failure has been eliminated in the present invention by virtue of the fact that all microcontrollers in the field replaceable portions talk directly to the locomotive controller over a common network and speak the same language that the locomotive microcontroller speaks. This is specified in amended Claim 9 where it states that the one or more redundant common networks of Claim 8 are controller area networks (CANs) which is the network in use in the locomotive.

As with Claim 1, Claim 12 has been amended to include the limitations that the microcontrollers each have redundant independent microprocessors and a redundancy control

portion for choosing which of the redundant microprocessors is active. The active microprocessor in each microcontroller is a processor that actively reads pressures from pressure transducers on its inputs and provides control of various solenoids via its outputs. While both microprocessors on each microcontroller are running identical software, only one of them is actively controlling the microcontroller solenoids. As previously stated, this limitation is not disclosed in the cited reference.

Likewise, Claim 13 has been amended to specify that the redundant networks link both the microcontrollers and the locomotive computer, and Claim 16 has been amended to specify that the one or more redundant networks are controller area networks (CANs), which as explained in the specification, are the type used by the locomotive computer.

Claim 30 has likewise been amended to include the limitations of Claims 1 and 12, specifically, the redundant independent microprocessors on each microcontroller and a redundancy control portion for choosing the active microprocessor on each microcontroller. Please note that the cited reference also does not teach or disclose a redundancy control portion because it is unnecessary in that design. The redundancy control portion is only necessary when the active microprocessor must be chosen from among a group of redundant microprocessors to be active on each of the microcontrollers.

Conclusion

The independent claims of the application have been amended to include limitations not disclosed in the cited reference and not discussed by the Examiner in the Office Action.


Therefore, the Applicants respectfully request reconsideration of the claims in light of those amendments and the arguments above and request allowance of the claims at the earliest possible time.

It is believed that this Response requires no fee. However, if a fee is required for any reason, please charge Deposit Account No. 02-4553 the necessary amount.

Should the Examiner have any questions regarding these amendments or arguments, the Applicants request that the Examiner contact the Applicants' attorney listed below.

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Respectfully submitted,



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Drawings

- A replacement Figure 4 is submitted herewith in which one instance of the reference number “68” has been replaced with the reference number “65”.
- A copy of the originally filed Figure 6 has been submitted herewith without amendment.